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Use of multiple opportunities for improving feeding practices in under-twos within child health programmes

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Objectives: In a community randomized trial, we aimed to promote exclusive breastfeeding and appropriate complementary feeding practices in under-twos to ascertain the feasibility of using available channels for nutrition counselling, their relative performance and the relationship between intensity of counselling and behaviour change. We also assessed whether using multiple opportunities to impart nutrition education adversely affected routine activities.

Methods: We conducted a community randomized, controlled effectiveness trial in rural Haryana, India, with four intervention and four control communities. We trained health and nutrition workers in the intervention communities to counsel mothers at multiple contacts on breastfeeding exclusively for 6 months and on appropriate complementary feeding practices thereafter. The intervention was not just training health and nutrition workers in counselling but included community and health worker mobilization.

Findings: In the intervention group, about 32% of caregivers were counselled by traditional birth attendants at birth. The most frequent sources of counselling from birth to 3 months were immunization sessions (45.1%) and home visits (32.1%), followed closely by weighing sessions (25.5%); from 7 to 12 months, home visits (42.6%) became more important than the other two. An increase in the number of channels through which caregivers were counselled was positively associated with exclusive breastfeeding prevalence at 3 months ($p = 0.002$), consumption of milk/cereal gruel or mix use at 9 months ($p = 0.004$) and 18 months ($p = 0.003$), undiluted milk at 9 months ($p < 0.0001$) and 24 hour non-breast-milk energy intakes at 18 months ($p = 0.023$), after controlling for potential confounding factors. Intervention areas, compared with the control, had higher coverage for vitamin A (45% vs. 11.5%) and iron folic acid (45% vs. 0.4%) supplementation.

Conclusions: Using multiple available opportunities and workers for counselling caregivers was feasible, resulted in high coverage and impact, and instead of disrupting ongoing services, resulted in their improvement.

Key words: feeding practices, nutrition education, nutrition counselling, child health

Introduction

Undernutrition is associated with over half of the 11 million childhood deaths that occur annually all over the world (UNICEF 2002; WHO 2002). The success of interventions to reduce undernutrition depends on the ability of programmes to promote improved child feeding behaviours (ACC/SCN 2001). Current feeding behaviours are often inadequate: exclusive breastfeeding duration tends to be short and complementary feeds are insufficient in quantity, too infrequently offered and often inadequate in their nutrient density or quality to meet the requirements of all important nutrients.

Several factors have been identified as being associated with successful promotion of behaviour change. These include the use of messages that are clearly understood, feasible to adopt within available resources, and not in contradiction with prevailing beliefs (ACC/SCN 2001). It is important to reach caregivers of target children through channels that are credible, and to deliver the messages consistently and with enough intensity to motivate recipients to attempt and sustain new behaviours (WHO 1998; ACC/SCN 2001).

Programmes to improve the health and nutrition of children have many opportunities for communicating

with caregivers. These opportunities can be found within the health system – such as consultations for sick children, immunization sessions and also in extension activities carried out by community health workers to support and mobilize communities. In most programmes, these opportunities are not used at all or are used ineffectively, the reasons being anticipated low feasibility, high worker training costs, the fear of disruption of successful ongoing activities and the fact that primary care workers may be governed by different administrative systems related to nutrition or health.

We conducted a community randomized effectiveness trial in rural Haryana, India, to test whether infant and young child feeding and physical growth could be improved through an educational intervention reliant on resources available to the health system. The main findings of this study have been published elsewhere (Bhandari et al. 2003, 2004). This paper reports on the feasibility and performance of several channels used for counselling caregivers, and the relationship with behaviour change of the number of channels used. We also assessed whether using several available opportunities for nutrition counselling affects ongoing services.

Subjects and methods

Study population and design

Between 1 January 1998 and 31 March 2002, we conducted a cluster randomized controlled trial in the state of Haryana, India, in communities located 3–5 km from the main highway.

Prior to study site selection, we sought collaboration from the local health system, who ultimately became partners in the study. We sought oral permissions from community leaders and obtained written informed consent from parents of infants who participated in the various outcome measurements. The study was approved by the ethics committees of the All India Institute of Medical Sciences and the World Health Organization.

Intervention

Formative research commenced in April 1998. Using quantitative and qualitative research methods, information was sought on community characteristics, children's nutritional status and feeding practices. Potential workers (channels) and opportunities for delivery of the intervention within the existing services were identified. Routine interactions of different categories of workers with families were observed to examine how counselling could be incorporated. For instance, we observed that at immunization sessions, counselling was possible only if another worker (the male multipurpose health worker or the Anganwadi worker) was present to assist the auxiliary nurse midwife, as is routinely recommended.

Feeding recommendations were developed using a standard approach that included assessment of child feeding practices and identification of common feeding problems, and locally appropriate options to solve them (WHO 1997a,b). Household trials were undertaken to test the acceptability of different recommendations (WHO 1997a,b). We then translated the final feeding recommendations into the local vernacular. During meetings which included representatives from different categories of health workers and the district health authorities, we selected the channels for delivery of these messages and the points at which caregivers would receive nutrition counselling. One worker of each type from each of the intervention communities was involved in the decision-making process. The person was selected by the district health authorities on the basis of being a good worker.

We undertook a baseline survey of all households with children younger than 2 years and calculated a total score for each community, based on socioeconomic indicators, child mortality, recent morbidity and the prevalence of wasting and stunting. On the basis of this score, communities were paired and one of each pair allocated to the intervention and one to the control group (Bhandari et al. 2003).

Between 1 October 1999 and June 2000, we identified all infants born in the study villages through Anganwadi workers and community informants, and this set of children comprised the cohort. Infants were enrolled if they lived locally and parental consent was given. Of the 1115 infants identified, 90 did not participate in the study (5 families were not available, 25 were non-residents, 25 died before the first visit and 35 refused to participate). A study fieldworker completed a baseline form containing details of the child and family characteristics at the time of enrolment.

According to national policy, workers in these sites advise exclusive breastfeeding for 4–6 months and the initiation of complementary feeding at 4–6 months. They recommend the types of foods to be fed and the frequency of feeding. Monthly weighing sessions by Anganwadi workers, and weekly immunization sessions at Anganwadi centres by auxiliary nurse midwives assisted by Anganwadi workers and the male multipurpose health worker, are also expected to be conducted. Home visits are routinely made by Anganwadi workers to families with young infants, but are primarily to advise about immunization and family planning.

It was intended that the following channels and opportunities for counselling would be used in the intervention communities: traditional birth attendants to counsel on immediate and exclusive breastfeeding at birth; local village-based workers (Anganwadi workers) belonging to the Integrated Child Development Services Scheme (Integrated Child Development Services Scheme 1982) to counsel on under-twos during weighing sessions once every 3 months, and on newborn infants during home visits once a month until aged 1 year. Auxiliary nurse midwives would counsel at immunization clinics, and primary health centre physicians and private practitioners

at sick child contacts. To support community-based activities, one worker in each of the four intervention communities was recruited by the health authorities from a local non-government organization (NGO).

To generate awareness, the intervention messages were also discussed at the monthly meetings routinely convened by the auxiliary nurse midwife with community representatives. The community representatives in turn held neighbourhood meetings once a month with caregivers of under-twos to relay the messages they had heard at the previous meeting. The messages imparted were immediate breastfeeding after birth, feeding only breast milk for the first 6 months of life and breastfeeding the infant day and night, at least eight times in 24 hours. The intervention messages also included starting complementary foods at 6 months of age; the specific foods, such as locally available and acceptable cereal/legume and milk/cereal gruels and mixes, that should be offered from 6 months age; meal frequencies and the amounts to be fed at different ages while continuing to breastfeed; ways to encourage children to eat more; hand washing before a meal; and continuing feeding during illness (Bhandari et al. 2004). It was intended that these foods be prepared by mothers at home and free foods were not provided. Vitamin A and iron/folic acid supplementation were routinely available through auxiliary nurse midwives at immunization sessions.

A set of materials was developed to support communication with caregivers. These were posters for doctors' clinics, a flip book covering different topics to be used as a visual aid by workers while counselling, and a card with age-appropriate feeding recommendations for common feeding problems, along with counselling messages, also for use by health workers. A mother-and-child card, listing feeding recommendations at each age, was given to caregivers at antenatal clinics or at the first home visit after the birth of the baby. Over the study period, several activities to generate awareness about the programme were conducted in the intervention communities. These included a rally by school children with banners promoting intervention messages, a 'healthy baby' show, debates in schools, street-side plays and a nutrition fair.

All health and nutrition workers, including physicians, in the intervention communities attended a 3-day training course. Half the course was used for hands-on-training in counselling individuals or groups of mothers. The training was based on an adaptation of the Integrated Management of Childhood Illnesses Training Manual on 'Counselling the Mother' that includes specific guidance on breastfeeding and complementary feeding counselling (WHO 1997c).

In the intervention communities, at each designated opportunity, the health worker (channel) was expected to assess a child's feeding practices, identify specific problems, counsel the caregiver and assist her in choosing the recommendations that were feasible and acceptable to her.

Delivery of the intervention was monitored by the local health authorities at their routine monthly review meetings. The investigators' role was restricted to the measurement of outcomes. Feedback from the monthly review was given by the health authorities to the workers. Overall, the intervention included not only training of health and nutrition workers in counselling, but also community and worker mobilization.

Outcome assessment

Mothers and infants in the birth cohort received home visits by a study team member at 3-month intervals until the child was aged 18 months, to ascertain exposure to various channels at different opportunities. At these visits, information was elicited for the most recent contact with each channel in the last 3 months, the details of counselling (if any) received at that contact, and morbidity experienced in the past 3 months. Twenty-four hour dietary recalls were conducted at 3, 9 and 18 months of age as described previously (Bhandari et al. 2001). These were analyzed to assess frequency of breastfeeding, types of foods consumed, frequency of feeding semi-solids and solids, and energy intake from non-breast-milk foods (Bhandari et al. 2004). Weights and lengths were also obtained every 3 months (Bhandari et al. 2003, 2004).

To ascertain intervention impact in the whole community, a cross-sectional survey was also done 18 months after the start of the intervention in all the eight sites. In this survey, the same outcomes were assessed through household interviews with caregivers of under-twos.

Analysis

The key opportunities analyzed (at which the caregiver could have been counselled) were contacts with health care providers (government or private), weighing and immunization sessions, and home visits. Exposure to these channels was calculated independently of whether the mother was counselled at the contact or not. The prevalence of counselling at each of these opportunities was estimated. Non-breast-milk energy estimates, breastfeeding and complementary feeding practices reported are based on the 24-hour dietary recalls (Bhandari et al. 2001). The number of channels at which caregivers were counselled was related to adoption of recommended breastfeeding and complementary feeding behaviours and to the overall energy intake as reported by the mother. These analyses were done in the intervention group only. To assess the impact of the intervention on routine services, the intervention and control areas were compared.

In logistic regression models run separately, we assessed the effect of potential confounding factors on the association between the number of channels at which caregivers were counselled and exclusive breastfeeding

Table 1. Percentage of caregivers exposed to counselling opportunities at different ages of the child in the intervention (I) and control (C) communities, irrespective of whether they were counselled or not

Counselling opportunity	Age of child					
	3 months I/C (n = 483/412)	6 months I/C (n = 468/412)	9 months I/C (n = 451/403)	12 months I/C (n = 447/412)	15 months I/C (n = 446/404)	18 months I/C (n = 435/394)
Visits to government physicians	16.6/6.8[c]	21.4/12.6[c]	23.1/11.9[c]	19.5/6.8[c]	16.1/7.7[c]	15.2/5.1[c]
Visits to private practitioners	64.0/67.5	74.6/79.6	77.8/80.4	75.4/74.8	74.2/73.7	78.4/78.7
Home visits	52.6/26.7[c]	52.8/23.1[c]	67.4/30.8[c]	64.0/15.8[c]	62.1/10.9[c]	56.3/8.1[c]
Immunization sessions	85.7/80.1[a]	83.5/78.2[a]	77.4/85.4[b]	80.3/79.4	53.4/57.2	43.7/45.2
Weighing sessions	41.8/5.3[c]	48.7/4.6[c]	47.2/1.5[c]	45.0/1.2[c]	41.5/0.5[c]	36.5/0[c]

Intervention vs. control: [a]$p < 0.05$; [b]$p < 0.01$; [c]$p < 0.001$.

status at 3 months, and use of cereal/legume mix or gruel, use of milk/cereal gruel or mix and undiluted milk at 9 and 18 months. In addition to the number of channels at which the caregiver was counselled (0, 1 or 2, ≥ 3), the independent variables assessed for inclusion in these models were gender, birth at home, birth weight, mother's age, mother's literacy category (0, 1 to 5, >5), father's literacy category, mother's working status and family income. Variables that showed an association with the outcome in a bivariate analysis ($p < 0.2$) were included in the models. We also used the same process for identifying independent variables in multiple linear regression models run separately, with 24-hour breastfeeding frequency at 3 months, the total duration of exclusive breastfeeding, and energy intakes at 9 months and 18 months as the dependent variables.

Results

A total of 1025 newborns were enrolled in the cohort (552 in the intervention and 473 in the control). In the cross-sectional survey, a total of 2350 interviews were conducted (1173 in the intervention and 1177 in the control communities). The data reported in this paper are primarily from the birth cohort. For a few variables where data were available only from the cross-sectional survey, these have been reported and the source specified.

Exposure to various channels in the intervention communities

The majority of births were assisted by traditional birth attendants; 72.5% in the intervention communities and 67.7% in the control areas. Immunization contacts were the most common opportunities for counselling during the first 9 months of life (Table 1). The percentages in Table 1 reflect the proportion of caregivers who reported at least one contact with that particular channel in the previous 3 month period, irrespective of whether this contact resulted in counselling or not. Beyond 9 months, health care provider visits were the most common opportunity. Over 95% of children were exposed to at least one of the channels, 26 to 34% were exposed to at least 2 channels and 29 to 34% to three or more channels between the ages of 3 and 18 months (data not shown).

Monthly meetings conducted by auxiliary nurse midwives with community representatives and neighbourhood meetings held by community representatives were additional opportunities that generated awareness about the intervention. The highest attendance of caregivers of infants in the cohort at monthly meetings was 28.4%, at the 12 months assessment; for neighbourhood meetings it was 20.2% at 18 months.

Sources of counselling in the intervention communities at different ages

Data on deliveries conducted by traditional birth attendants or 'dais' were only available through the cross-sectional survey. Rates of counselling by dais for the intervention group were 32% for immediate breastfeeding, 14.3% for advice on not giving any water and 18% for advice against administering ghuttis, a herbal product.

In the intervention communities, the proportion of mothers counselled through any of the channels was highest between 6 and 9 months of age (69.6%) and lowest during the 3 to 6 month period. In the initial 3 months of life, immunization sessions were the most common (45.1%) reported source of counselling, followed by home visits and weighing sessions. There was a significant increase in the proportion counselled during home visits at 6 months ($p = 0.003$; Table 2). Between 6 and 9 months of age, home visits were the most common reported source of counselling (42.6%), followed by immunization and weighing sessions; these rates were similar for the 9 to 12 month period. In the 12 to 18 month period, counselling during home visits and weighing sessions continued to be important, but counselling at immunization sessions declined as expected, because fewer children are brought for immunization at this age. Government physicians or private practitioners rarely counselled caregivers of children who sought care from them (Table 2).

Table 2. Percentage of caregivers who reported being counselled at different ages of the child

Opportunities at which counselled in the last 3 months	Age of the child					
	3 months (n = 483)	6 months (n = 468)	9 months (n = 451)	12 months (n = 447)	15 months (n = 446)	18 months (n = 435)
Intervention communities						
Contact with government physicians or private practitioners	2.3	1.1	1.6	1.8	1.1	1.2
Home visits	32.1	23.5	42.6	42.5	41.5	41.2
Immunization sessions	45.1	39.5	34.2	34.5	20.0	11.3
Weighing sessions	25.5	24.2	36.1	36.0	34.5	24.4
Counselled at any of the 4 opportunities	61.7	53.2	69.6	66.9	60.5	55.9
Control communities						
Counselled at any of the 4 opportunities	1.7[a]	1.2[a]	0.7[a]	1.2[a]	1.0[a]	0.8[a]

[a]$p < 0.001$; intervention vs. control.

Table 3. Caregivers reported frequency of counselling in the previous 3 months at different ages of the child in the intervention communities

Number of channels at which caregivers counselled in the previous 3 months	Age of child					
	3 months (n = 483)	6 months (n = 468)	9 months (n = 451)	12 months (n = 447)	15 months (n = 446)	18 months (n = 435)
Counselled by all 4 channels[a]	3 (0.6)	1 (0.21)	1 (0.2)	3 (0.67)	–	–
Counselled by any 3 channels	60 (12.4)	37 (7.9)	52 (11.5)	49 (11.0)	33 (7.4)	10 (2.3)
Counselled by any 2 channels	80 (16.6)	87 (18.6)	95 (21.1)	107 (23.94)	97 (21.7)	76 (17.5)
Counselled by any 1 channel	155 (32.1)	124 (26.5)	166 (36.8)	140 (31.3)	140 (31.4)	157 (36.1)
Counselled by none[b]	185 (38.3)	219 (46.8)	137 (30.4)	148 (33.1)	176 (39.5)	192 (44.1)
Mean (SD) number of times caregiver counselled irrespective of channel	1.05 (1.05)	0.88 (0.99)	1.14 (0.99)	1.15 (1.02)	0.97 (0.95)	0.78 (0.81)

All values are n (%) unless otherwise indicated.
[a]The four channels were health care providers (government physicians or private practitioners), Anganwadi workers at home visits, Anganwadi workers at weighing sessions, and auxiliary nurse midwives at immunization sessions.
[b]Not exposed to the above four, but may have been exposed to traditional birth attendants at birth and community meetings.

Counselling by single or multiple channels

Not all contacts with channels led to counselling. Between 30 and 47% of mothers did not report being counselled by any of the four channels during the 3-month recall window between birth and 18 months of age (Table 3). Nearly a third of mothers reported being counselled by only one channel, a quarter by two or three channels; counselling by all four channels was rarely reported between birth and 18 months (Table 3).

Among the 155 mothers reporting being counselled through only one channel at the 3-month assessment, immunization clinics (56.7%) were the most common source of counselling, followed by home visits (28.4%), weighing sessions (11.6%) and sick child contacts (3.2%). At the 9-month assessment, in those who reported being counselled only once, home visits (48.6%) were the most common source of counselling, followed by weighing sessions (31.3%) and immunization sessions (27.1%).

Numbers of channels at which caregivers received counselling and feeding practices

These data are shown in Tables 4 and 5. P values prior to and after adjustment for confounding factors are given in the tables and only the latter are mentioned in the text. Infants who were counselled by one or more channels irrespective of source were more likely to be exclusively breastfed than those never counselled ($p = 0.016$). The mean duration of exclusive breastfeeding in days was 2 weeks longer in those counselled ($p = 0.023$; data not shown).

The proportion of children exclusively breastfed at 3 months of age increased with the number of channels at which caregivers were counselled ($p = 0.002$; Table 4). This relationship was also statistically significant at 4 months of age ($p = 0.001$).

The relationship between number of channels at which caregivers received counselling in the previous 3 months and the 24-hour energy intakes, use of cereal/legume gruel or mix, milk/cereal gruel or mix and use of undiluted milk is shown in Table 5. After controlling for potential confounding variables, there was a significant positive association between number of contacts at which counselled and mean energy intakes at 18 months, use of milk/cereal gruels or mix at 9 and 18 months, and use of undiluted milk at 9 months.

The proportion of children consuming the recommended calories for 18 months of age at that age increased

Table 4. Association between number of channels at which caregivers reported counselling and breastfeeding practices in the intervention communities

Number of channels at which caregivers counselled in the last 3 months	Exclusively breastfed at 3 month visit n (%)	Frequency of breastfeeding/24 h at 3 month visit Mean (SD)	Total duration of exclusive breastfeeding in days Mean (SD)[a]
0	131 (70.8)[b]	9.1 (3.4)[b]	114.1 (67.8)[c]
1 or 2	191 (81.3)[d]	9.3 (2.8)[d]	127.3 (59.7)[e]
≥3	59 (93.6)[f]	9.4 (1.9)[f]	128.7 (54.9)[g]
p value			
unadjusted	0.0002[h]	0.228[i]	0.090[j]
adjusted	0.002	0.341	0.064

[a]Estimated from information obtained at the 9 month visit.
[b]n = 185.
[c]n = 164.
[d]n = 235.
[e]n = 211.
[f]n = 63.
[g]n = 58.
[h]Chi square for trend.
[i]Non-parametric test (Kruskal Wallis – H).
[j]Analysis of variance.

Table 5. Association between number of channels at which caregivers reported counselling and complementary feeding practices in the intervention communities

Number of channels at which caregivers counselled in last 3 months	Mean (SD) non-breast-milk energy intake (kcal/24 h) at		n (%) consuming Cereal/legume gruel or mix		Milk/cereal gruel or mix		Undiluted milk	
	9 months	18 months	9 months	18 months	9 months	18 months	9 months	18 months
0[a]	368 (274)[d]	887 (354)[f]	34 (24.8)[h]	95 (49.5)[j]	41 (29.9)[l]	54 (28.1)[n]	71 (51.8)[p]	107 (55.7)[r]
1 or 2[b]	358 (259)	920 (376)	76 (29.1)	118 (50.6)	94 (36.0)	85 (36.5)	139 (53.2)	148 (63.5)
≥3[c]	449 (260)[e]	1094 (281)[g]	16 (30.2)[i]	3 (30.0)[k]	26 (49.1)[m]	6 (60.0)[o]	37 (69.8)[q]	8 (80.0)[s]
p value								
unadjusted	0.016[t]	0.173[u]	0.614[v]	0.441[v]	0.047[v]	0.037[v]	0.062[v]	0.116[v]
adjusted	0.550	0.023	0.068	0.723	0.004	0.003	0.000	0.089

[a]9 month group: n = 137; 18 month group: n = 192.
[b]9 month group: n = 261; 18 month group: n = 233.
[c]9 month group: n = 53; 18 month group: n = 10.
Students t test: d vs. e, p = 0.483; f vs. g, p = 0.076.
Chi square test: h vs. i, p = 0.128; j vs. k, p = 0.432; l vs. m, p = 0.0001; n vs. o, p = 0.070; p vs. q, p = 0.0001; r vs. s, p = 0.024.
[t]Non-parametric test (Kruskal Wallis – H).
[u]Analysis of variance.
[v]Chi square for trend.

significantly with increasing number of contacts at which counselling was received (Chi square for trend, p = 0.004); it was also higher at 9 months but not statistically significant (p = 0.06; data not shown).

Effect of the intervention on routine services

An important component in assessing the feasibility of involving existing channels in nutrition counselling is whether this would negatively affect routine services (Table 1). The contrary was seen in this setting. Compared with the control communities, there was a significant increase in visits to immunization sessions at 3, 6 and 9 months (p < 0.05), to weighing sessions (p < 0.0001) and to government health centres (p < 0.0001) at all ages in the intervention communities. At the home visits conducted by study fieldworkers when infants were aged 3 months, 87% of caregivers in the intervention areas possessed the mother-and-child card promoted through the intervention, compared with 74% possessing other immunization cards in the control areas. The immunization rates in the intervention and control sites, respectively, as reported in these cards were 64.6 vs. 20.6% for BCG (p < 0.0001), 65.2 vs. 23.1% (p < 0.0001) for the first dose and 18 vs. 5.8% (p < 0.0001) for the second dose of OPV and DPT vaccines.

In the cross-sectional survey, the reported rates for vitamin A supplementation at the measles immunization contact were 45% in the intervention and 11.5% in the control areas; the corresponding rates for iron/folic acid supplementation were 45 and 0.4%, respectively.

Discussion

In programmes that aim to improve child feeding practices, the messages need to be well disseminated to reach the target population. This study demonstrates that by using existing channels for message delivery at existing opportunities, wide dissemination of messages related to optimal breastfeeding and complementary feeding practices was possible.

Birth attendants provided messages effectively for early initiation of breastfeeding and its exclusivity. The village-based Anganwadi workers were reported to counsel actively at home visits, weighing sessions and while assisting at immunization sessions. Immunization sessions were the most important opportunities in the first half of infancy, while home visits by Anganwadi workers, often facilitated by the local NGO workers, provided contact throughout infancy and were the most common opportunity for counselling between 6 and 18 months of life.

The study data highlight the importance of repeated counselling achieved by using multiple channels, as the number of contacts with channels was positively related to the prevalence of exclusive breastfeeding, better complementary feeding practices and energy intakes. Further, no single channel by itself achieved very high coverage and not all contacts were actually used for counselling; at immunization sessions, for instance, only half were counselled. Use of multiple channels may contribute to greater consistency of messages received by caregivers, although this was not assessed.

It is important to place the experience and findings of this study in the context of the developing world. Several lessons have been learnt from large-scale application of nutrition behaviour-change approaches in West Africa (Parlato and Seidel 1998). To achieve reach and frequency when promoting appropriate feeding behaviours requires careful research and planning in individual countries and in different regions within these. It is critical not only to reach large numbers of the target audience and all its segments, but to reach them frequently enough to stimulate lasting behaviour change. Use of multiple channels including one-on-one counselling, community support groups and mass media in several previous studies has led to greater behaviour change than with a single approach (WHO 2003). The number of channels used for one-on-one counselling may vary depending on several factors, such as the extent of contact with public health services, the number of sources already providing some nutritional advice to young children, their reach to all segments of the target audience and the degree of consistency between ideal recommendations and cultural beliefs. For these reasons, it seemed appropriate to use multiple channels in this setting. On the other hand, significant improvement in feeding and growth was reported in rural China through monthly counselling in households by a trained nutrition worker (Guldan et al. 2000). In Brazil, contact with health workers is very high and this channel was used to improve complementary feeding practices (Santos et al. 2001).

Engaging resources from existing services to additionally promote improved feeding behaviours did not have a negative effect on service delivery, but actually improved routine services such as the use of weighing sessions, care seeking from public health facilities and coverage of vitamin A and iron/folic acid supplementation. However, the presence of the Hawthorne effect, i.e. the tendency of study participants to change their behaviour when targeted by special attention, independent of the specific nature of the intervention, cannot be ruled out.

An important question is whether the intervention using existing channels for message delivery improved complementary feeding behaviours and growth at 9 and 18 months of age. These data, published elsewhere, showed significant improvement in consumption of cereal/legume gruels or mixes (i.e. cereal and legumes both cooked separately but mixed at the time of feeding), milk/cereal gruels or milk/cereal mixes (cereal cooked separately to which milk is added) and of undiluted milk at 9 and 18 months in children in the intervention communities. The meal frequencies and non-breast-milk energy intakes were also higher in the intervention communities at 9 and 18 months of age. Linear growth but not weight gain was also significantly higher in the intervention group than in the control group children (Bhandari et al. 2004).

Some potential limitations may be noted. The local NGO workers played an important role in supporting government-based health and nutrition workers in mobilizing the community and maintaining their performance. The performance of channels may have been less efficient without such facilitation. The relationship between the contacts with channels and feeding behaviours may have been influenced by potential confounding factors that were not measured and therefore not adjusted for. Thus, those who had better feeding behaviours may also be the ones more likely to visit weighing or immunization sessions more frequently, or recall that they were counselled. The observed increased coverage of BCG, OPV and DPT at the 3-months home visit was based on examination of mother-and-child cards in intervention communities and government cards in control communities. Some of this increase may be related to a higher proportion of families in the intervention group possessing the card and better recording of immunization in these communities.

This study establishes the justification for introducing counselling to improve breastfeeding and complementary feeding practices within existing child health and nutrition programmes. Nutrition counselling interventions are considered of high priority to accelerate the decline in undernutrition rates. Our study demonstrates that to achieve high coverage and wide adoption of recommended behaviours, many types of primary care workers and counselling at multiple opportunities are essential.

In the Indian context, the study highlights that mobilizing Anganwadi workers and mothers is more rewarding in terms of counselling than training health workers in the same. Moreover, it is feasible to use multiple opportunities available within existing programmes without affecting routine services, and indeed some of these are substantially enhanced by this approach.

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